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(19)



(54) SHAFT SEAL

(71) We, GELENKWELLENBAU G.m.b.H., a Company organised under the Laws of Germany, of 43 Essen, Westendhof 7, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a shaft seal, for example, for sealing the journal of a universal joint relative to the inner end of its bearing cap, with a contact ring with a resilient sealing lip.

An object of the invention is to provide an efficient shaft seal with a long life.

To this end, according to the invention, the seal comprises a ring with a resilient sealing lip, and a sheet metal casing for the ring having a skirt portion which extends parallel with the shaft axis and is embraced with slight clearance by the legs of a member of U-section mounted on the shaft to provide a labyrinth seal.

In a seal of this kind, the skirt and member act as a sealing gland assisting the sealing action of the contact lip seal. Also, the gland protects the contact lip seal from undesirable external influences such as dirt.

The invention may be carried into practice in various ways and one embodiment will be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a section through the yoke of a universal joint, with a journal inserted with its bearing into the hole in the upper portion of the yoke; and

Figure 2 illustrates the bearing and seal for the journal in a partial section similar to Figure 1, but on a larger scale and with the yoke omitted.

The universal joint shown in Figure 1 comprises two yokes which are set at 90° to one another and of which only one yoke 1 is shown. The yokes are connected in the usual manner by a journal cross 2. Figure 1 shows only that end of the cross associated with the hole in the upper portion of the yoke 1. This end, like the other three

ends of the cross, is formed by a journal 3 which is received by the hole in the yoke and which forms the inner race for two rings of rollers 4. The outer race for the roller rings 4 is formed by the inner periphery of a drawn sheet-metal tube 5, whose in-turned ends 6 retain both ends of the roller rings 4 axially. The sheet-metal tube 5 is supported in turn by being pressed into the inside wall of a cup-shaped solid bearing cap 7, which is received in the hole in the yoke and is prevented from dropping out by a circlip 8.

The combination of the bearing cap 7 with the sheet-metal tube 5 comprising the outer race for the rollers 4 has the advantage that the cap 7 need not be heat-treated or provided with the bearing surfaces normally required for the ends of the rollers 4.

A floating end check plate 10, with a recess 9 on each side, is provided between the end or base of the cup-shaped bearing cap 7 and the outer end of the journal 3. This end check plate 10 ensures that the rollers have a uniform supply of lubricant, which can be introduced through a filler plug 11 in the end of the cap 7. The check plate 10 also provides very low-friction axial support for the journal 3, as the recesses 9 form lubricant reservoirs so that a film of lubricant is always present between the two faces of the plate 10 and the adjacent surfaces respectively of the journal 3 and the end of the cap 7.

Between the base of the journal and the inner end of the cap 7 is a seal 12. This seal comprises a radial shaft sealing ring 13, whose sealing lip 14 is kept in contact with a smooth cylindrical surface 16 on the journal 3 by a coil spring 15. The outer periphery of the ring 13 is retained by a sheet-metal casing 17, which fits into a recess in the inner end of the cap 7. A free end 18 of this casing 17 extends parallel to the axis of the journal 3, projecting away from the shaft seal 13 towards the centre of the journal cross. This portion 18 is embraced, with sealing clearance, by a sheet-metal member 19 with a U-shaped cross-section,

the radially inner upright of the U being pressed onto and bearing on a step 20 formed by a shoulder 21 on the cross.

- 5 The ring 13 also has a radially inward lip in contact with a curved surface joining the surface 16 to the step 20. The closely spaced members 18, 19 act as a labyrinth sealing gland upstream of the contact seal 13 to protect the lips from dirt and dust.
- 10 The clearance might be between 1 and 10, or 10 and 20, or 20 and 30 thousandths of an inch radially and/or axially.

WHAT WE CLAIM IS:—

- 15 1. A shaft seal comprising a ring with a resilient sealing lip, and a sheet metal casing for the ring having a skirt portion which extends parallel with the shaft axis and is embraced with slight clearance by the legs

of a member of U-section mounted on the shaft to provide a labyrinth seal. 20

2. A shaft seal constructed and arranged substantially as heren specifically described with reference to numerals 13, 14, 16, 17, 18 and 19 of Figure 2 of the accompanying drawings. 25

3. A seal as claimed in either preceding claim in which the said slight clearance is less than 0.030 inches.

4. A shaft seal as claimed in any of the preceding claims used to seal a journal of a universal joint. 30

5. A seal as claimed in Claim 4 which is positioned at the radially-inner end of the journal. 35

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Fig.1

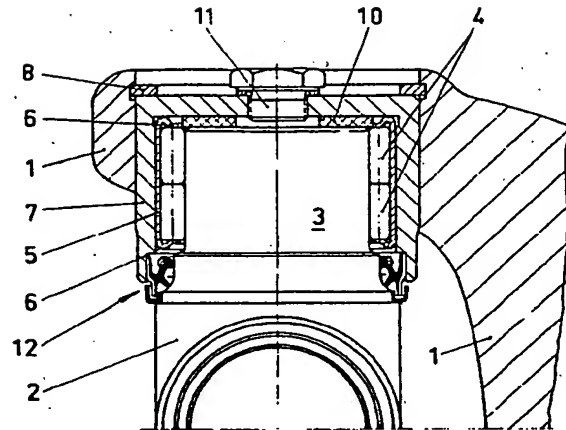
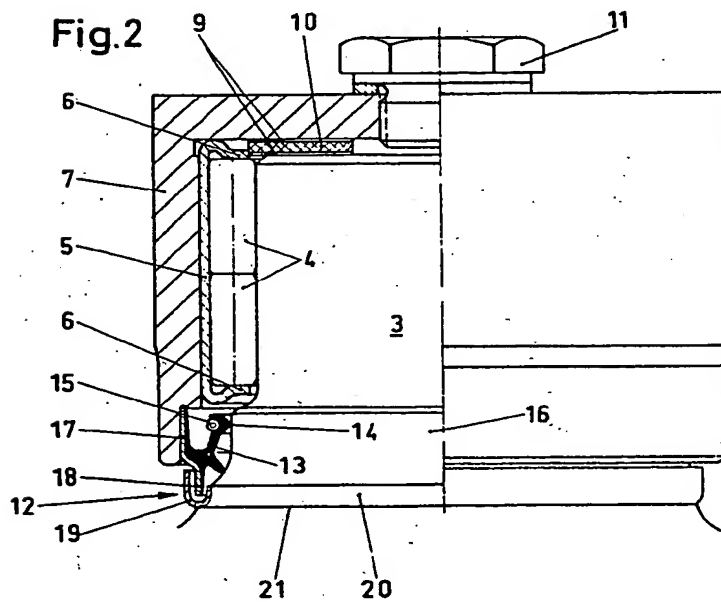


Fig.2



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